



November 9, 1994

Dr. Robert J. Bonometti
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Executive Office of the President
Office of Science and Technology Policy
Old Executive Office Building
Washington DC 20500

Dear Bob:

It was a pleasure meeting with you on Friday, October 28th, to continue our dialogue on ways to speed the deployment and reduce obstacles to the rapid and economical roll out of new, Personal Communications Services (both narrowband and broadband).

As we discussed, there are several areas in which the executive branch can significantly contribute to the successful realization of PCS' full potential. These include:

1. **Establishing a uniform and consistent policy on deployment of PCS infrastructure.** The myriad of conflicting and inconsistent state and local regulations regarding the construction and operation of wireless telecommunications facilities threaten to ~~undermine~~ Federal goals of an increasingly competitive and robust commercial mobile radio service market and are contrary to the public's interest in a high quality, low cost, ubiquitous and spectrum-efficient wireless component to the National Information Infrastructure. The procedures and standards for constructing mobile radio towers and transmission facilities vary from locality to locality resulting in delays and increased cost of implementing effective, wide area communications networks. Some localities even prohibit new construction, an issue which has particularly negative ramifications for new licensees in broadband and narrowband PCS. National leadership, similar to that shown in the establishment of a comprehensive and uniform regulatory treatment of Commercial Mobile Radio Services in the Omnibus Budget Reconciliation Act of 1993, are needed in this area.
2. **Making Federal property available for siting of PCS facilities.** Federal property could, in many situations, provide prime locations for PCS base stations. Unfortunately, many agencies of the Federal Government are not willing to entertain such facilities because of perceived administrative burdens, lack of benefit to local agency staff or lack of clear policy or regulations for the leasing of Federal property for such an installation. A clear directive from the executive branch is required to overcome these obstacles. The benefits to the Federal Government include a substantial increase in the revenues from the installation of PCS networks above and beyond the auction proceeds, and improved communications on Federal property. Moreover, it would be a demonstration of leadership by the Federal government to tangible actions to implement the NII, and could encourage similar cooperation and participation by non-Federal entities.

3. **Establishing a uniform and consistent policy on access to and cost of sites on Federally-owned land.** Making sure Federal land resources continue to be available for efficient delivery of mobile communications services and ensuring that taxpayers receive a fair price from every communication company with transmitters on public lands are goals shared by industry, the Federal agencies and the public. Along with setting a clear directive that Federal land is to be used to accommodate PCS facilities, the executive branch needs to establish a clear set of policies and guidelines for implementing that directive. All of the Federal agencies that have private communications facilities on them have different regulations, lease documents and processes for doing so. These are often difficult, time consuming and expensive for both the agency and the communications companies. One clear, concise set of guidelines for locating the sites and establishing lease costs and documents is an absolute must to successful implementation of this directive. It will also overcome many of the objections of agencies which have been reluctant to entertain such facilities. The General Services Administration here in Washington has made great strides in this direction, and their policies and procedures might be the model to use for all Federal-owned land.

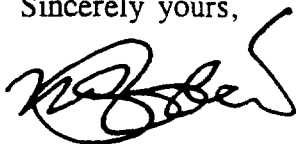
PCIA, in its more than four year commitment to new broadband and narrowband PCS, is currently actively pursuing a range of issues at the Federal Communications Commission and with the National Telecommunications and Information Agency which are absolutely critical to the successful deployment of these new services, once licensed. These include:

1. efforts to ensure adequate interconnection at reasonable prices (including availability of numbering resources) on an equal basis for all PCS providers;
2. successful implementation of the *Omnibus Budget Reconciliation Act of 1993* comprehensive and uniform framework for regulation of Commercial Mobile Radio Services, including the *Act's* preemption of state rate and entry regulation;
3. coordination of PCS frequency use in areas adjacent to the Canadian and Mexican borders;
4. coordination of PCS frequency use with adjacent, government spectrum; and
5. emergency response (eg; E 911) plans for PCS.

The Administration's support and advocacy for this agenda before the FCC and within NTIA would materially advance the wireless component of NII policy.

PCIA looks forward to continuing to work with you on these critical issues.

Sincerely yours,



Mark J. Golden, CAE
Acting President



July 26, 1995

VIA FAX

To: **Site Owners and Managers Association**

From: **Sheldon Moss**

Re: **U.S. Postal Service Intends to Make Many
Facilities Available for Wireless Communications**

The following is an early "heads up" for SOMA members:

We've recently learned that the U.S. Postal Service (USPS) intends to make available post office facilities to wireless communications service providers for antenna space.

- **The purpose of this venture is to enable the Postal Service to maximize revenues from the management of its real estate assets.**
- **USPS owns about 5,500 properties and leases another approximately 29,000 properties. It is primarily the USPS-owned properties that will be open to basing transmitter facilities.**
- **Towers or other structures sited on USPS-owned property may not be subject to many local zoning and land-use rules.**

(While USPS facilities may be exempt from certain land-use ordinances, the USPS still intends to follow a "good neighbor" policy, where it will take into consideration any effects that telecommunications structures may have on local communities.)

- **USPS is already leasing space to a small number of wireless carriers.**

In a meeting with Bill Loewenthal and Michael Kunstadt of the USPS, I provided them with general information about the facility or site management industry and indicated it may be to their advantage to work with professional site managers who are skilled in the business of operating and managing multi-use and single-use wireless facilities. I suggested to them that where the USPS may not have the personnel nor the requisite knowledge of the wireless telecom industry to manage its facilities to optimal advantage, it might be smarter to turn over the actual management or operations to site or facility management companies well-versed in this field.

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PCIA is the consolidation of the Personal Communications Industry Association and the National Association

USPS has standard contract formats for both rooftop space and ground leases for towers. Terms are 5 years with options to renew. They include escalator clauses as well as provisions for subletting that requires the lessee to pay 50% of the gross rents collected by the lessee. My guess is that terms, conditions, and rates will be negotiable.

Attached is an information release from Bill Loewenthal of the USPS. Bill is the primary contact for inquiries about leasing antenna space.

Please do not hesitate to contact me if you have questions. Thanks!

attachment: USPS informational release (below)

POSTAL SERVICE OFFERS ANTENNA SITES

The United States Postal Service is one of America's largest owners, developers, and managers of real estate. Its inventory contains more than 34,000 buildings having a total floor area in excess of 250 million square feet, situated on 1 billion square feet of land.

The Postal Service's real property inventory is conservatively valued at more than \$7 billion dollars. These properties are situated in virtually every community in the nation. Postal properties range from major facilities of over three million square feet in urban areas to small thirty square foot facilities in rural areas.

With over 34,000 leased and owned facilities, the Postal Service can offer a wide range of possible antenna locations for the wireless communications industry. It is establishing a method whereby multi-antenna sites could be controlled under one contract with only one payment to cover the monthly rent. This concept would provide flexibility to add or deduct sites at any time.

In fact, the Postal Service has been actively pursuing the leasing of antenna sites during the past year. It has received the necessary internal clearances and approvals, has a single point-of-contact for information (Bill Loewenthal, 202/268-5765), has the leasing process established, and has in fact, entered into a number of leases for antenna sites with a number of telecommunications firms.

The Postal Service is very receptive to expressions of interest to locate antennas in (or on) post offices. If you contact Bill Loewenthal at postal Headquarters, he will provide you with a disk listing post office locations across the nation, as well as the standard postal lease forms. To obtain this information, send a written request to William J. Loewenthal, Asset Management, U.S. Postal Service, 475 L'Enfant Plaza SW, Washington, DC 20260-6433.



NUMBERING ADMINISTRATION

A. Exhaust of toll free numbering resources and access to toll free numbers for personal communications services, such as paging

The imminent exhaust of 800 toll free number resources poses serious challenges to the entire telecommunications industry. PCIA is an active participant in the Commission's ongoing effort to manage this resource until new called party pays, toll free numbers can be brought on line.

The industry has been concerned, however, with one possible tactic to address the increased demand for toll free numbering resources which is under consideration: prohibiting use of toll free numbers for "individual" or "personal" applications. Requiring services, such as paging, to employ PIN technology rather than personal 800 numbers would result in technically inferior service, a less efficient use of Public Switched Telephone Network resources and preclude the use of Signalling System Seven (SS7) technology for future paging and enhanced PCS offerings. Moreover, significant competitive concerns would be raised by such an action, such as inequitable dialing requirements, reduction in customer flexibility to change services or provider, and discriminatory access to the resource amongst competing service providers.

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July 19, 1995

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Kathleen M. H. Wallman
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Dear Kathy:

Attached is the white paper that follows up on the recent PCIA meeting with you and your staff concerning 800 number usage. PCIA, with enormous assistance from many of its paging members, is submitting this report to the Commission to outline the technical and other problems associated with restricting or otherwise requiring paging operators to employ PIN technology in connection with their toll-free paging services. The report demonstrates that for many technical, competitive, and equitable reasons, the paging industry should not be required to revert back to employing old PIN technologies, when their customers need and demand new, direct dial services.

If you have any questions concerning the white paper or PCIA's views on 800 number usage and PIN technology, please call Mark Golden or Rob Hoggarth of PCIA (467-4770) or myself. PCIA appreciates the opportunity to submit this white paper and looks forward to working with the Commission to develop appropriate policies regarding toll-free numbering resources.

Sincerely,



Robert L. Pettit
Counsel to Personal Communications
Industry Association

Enclosures

cc: Kathleen B. Levitz (w/encl.)

**Personal Communications Industry Association's
Proposed Approach For The
Toll-Free Resource**

July 19, 1995

TABLE OF CONTENTS

<u>PARA. NO.</u>	<u>TITLE</u>	<u>PAGE NO.</u>
1.0	INTRODUCTION	1
2.0	BACKGROUND	2
2.1	SPECIAL ACCESS CODES	3
2.2	CURRENT DIALING ARRANGEMENTS FOR PAGING CARRIERS	4
2.3	THE PAGING INDUSTRY – UTILIZATION OF 800 NUMBERS	5
3.0	DIRECT INWARD DIALING IN THE SS7 ENVIRONMENT	7
4.0	VOICE MAIL AND PAGING	10
5.0	NARROWBAND PCS	12
6.0	SUBSCRIBER ACCESS DEGRADATION: INFERIOR DIALING NON-STANDARD ACCESS	13
7.0	DID vs PIN – OVERALL NETWORK EFFICIENCY	15
8.0	PROHIBITING PERSONAL 800 NUMBER BY PAGING SUBSCRIBERS WILL BE VERY DIFFICULT TO ENFORCE AND MAY BE WASTEFUL OF NUMBERING RESOURCES	17
9.0	NANP PLANNING AND NUMBER UTILIZATION	19
10.0	CONCLUSION	20

<u>FIGURE NO.</u>	<u>TITLE</u>
1	Conventional and SS7 Signaling Configurations
2	Voice Mail Systems and DID 800 Numbers
3	Efficiency Comparison of DID vs. PIN 800 Arrangement

INTRODUCTION

The Federal Communications Commission (FCC) staff has suggested the paging industry use Personal Identification Numbers (PIN), in combination with a standard 10-digit North American Number Plan (NANP) number, to access toll free paging services. This suggestion is made as a possible solution to meet the increased demand for called party pays (800 toll-free) resources. The growing use of these toll free numbers is due in part to two significant factors. First, 800 numbers are used for a growing number of subscribers and services, including small and large businesses, residential lines, pagers, voice mail, calling cards, Integrated Voice Retrieval (IVR) systems, announcement services, and other innovative services. Second, 800 number subscribers have become increasingly sophisticated and have developed a variety of telecommunications needs.

This report examines the issues and problems associated with the use of PIN dialing arrangements for the provision of messaging services. In addition, this report proposes that, in light of the significant technical, business, and public interest considerations, the opening of new Service Access Codes (SAC) is the logical and reasonable way to provide additional toll-free number resources without the necessity for PIN dialing arrangements.

PCIA is opposed to any restriction or requirement that toll-free number access for paging services be limited to a PIN arrangement for subscriber calling. PIN-based paging services are: (1) technically inferior; (2) less efficient in the use of PSTN network resources; (3) anticompetitive because of the additional dialing requirements; and (4) preclude the use of SS7 technology for future paging and enhanced PCS services.

2.0

BACKGROUND

For the reader's convenience, the following sections describe Special Access Codes, Dialing Arrangements, and the manner in which the paging industry has utilized them. They also provide support for the paging industry's conclusions that PIN technology is not substitutable for many paging uses and would, if required to be implemented, substantially degrade toll free paging services and would put paging carriers at a competitive disadvantage vis a vis their landline and wireless service competitors.

2.1

SPECIAL ACCESS CODES

Special Access Codes (SACs) are three digit codes that allow carriers and subscribers to enter into uniform billing arrangements under which either the caller or the called party pay for calls. Before SACs were available, toll call scenarios (dialing 1 + 10 digits) required the caller to pay for all charges associated with the completion of the call. SACs were created to allow the called party to pay the charges and thereby offer toll-free service to the caller. For the purposes of this report, only the called party pays (or toll-free) uses of SACs will be discussed.

Currently, 800 is the only SAC available to subscribers for toll-free calling. The Industry Numbering Committee (INC), under the auspices of the Industry Carrier Compatibility Forum (ICCF), assigned 888 as the next toll free SAC to provide relief for the 800 number resource, which is expected to be depleted by early 1996. In anticipation of future demand, INC also reserved the numbers 877, 866, 855, 844, 833, and 822 as additional toll free SACs. The designation of a toll free SAC is purely a marketing arrangement; there are no longer any technical requirements restricting the INC from choosing any area code configuration as an SAC. The seven codes referred to above that the INC has currently assigned for toll-free growth, to increase the capacity beyond the 800 resource, contain approximately 56 million individual assignable numbers. (This excludes the 16 million additional numbers that could be made available if the 8XX-100 and 8XX-000 series were able to be assigned.)

CURRENT DIALING ARRANGEMENTS FOR PAGING CARRIERS

Paging carriers currently are able to offer non-geographic numbers to their customers via two possible dialing arrangements within a toll-free SAC. Both methods of accessing messaging services via toll-free numbers maintain the called party pays billing arrangement.

Under the Direct Inward Dialing (DID) method, customers can access toll-free messaging services by dialing eleven (1 + 10) digits. The second method of accessing messaging services on a toll free basis requires the customer to dial eleven digits, and then to wait for the messaging service to answer, at which point the customer is then asked (typically by a recorded announcement) to enter a Personal Identification Number (PIN), in order to be connected to the desired service. Currently, there are no technical standards for PIN interconnections other than LEC tariffs for permissible subscriber connections. For the purposes of this report, 7 digit PINs will be assumed. Under this assumption, with PIN technology, a total of 18 dialed digits is required to set up a call to a paging subscriber.

The paging industry currently uses both DID and PIN arrangements for subscriber paging applications. The paging subscriber's specific communications needs and the paging carrier's business decisions determine whether DID and/or PIN interconnection is available to subscribers. As set forth below, DID numbers are essential or preferred in most applications because they allow subscribers (and the serving carrier) to benefit from SS7 services, are accessible even from rotary phones without operator intervention, and allow callers to retain the "ease of use" associated with other calls over the public network.

THE PAGING INDUSTRY – UTILIZATION OF 800 NUMBERS

Toll free 800 DID numbers are very attractive business tools that allow business and consumers to be reached anywhere, any time on a toll free basis, thus allowing them considerable flexibility in meeting their own business and consumer needs. Interexchange Carriers (IXCs), Local Exchange Carriers (LECs) and the paging industry have responded to the demands of their customers, in particular in the business environment, with a myriad of services using 800 numbers. Traveling subscribers are no longer tied to geographic area codes, and can offer their own customers the ease of communications (including paging) via a toll-free number. Although all customers of the telecommunications world have benefitted from the use of 800-type numbers, this report will concentrate on the specific needs of the paging industry.

PCIA estimates, based on conversations with its members, that the paging industry only accounts for a maximum of 500,000 of all 800 numbers, the bulk of which appear to be utilized on a DID basis. This total represents only 7% of the total 7.1 million 800 numbers assigned, although many wireline customers forward their business and/or residential 800 numbers to a paging device. Even including paging services that are forwarded from business or residential 800 numbers, however, paging providers currently are responsible for only a fraction of total existing 800 number use. Because of the many additional services that are rapidly becoming available, PCIA anticipates that the demand by paging for access to toll free SAC codes will continue to grow rapidly.

As shown below, 800 numbers provide PSTN access to a great variety of "paging" communications services:

Current Paging Services Accessed by 800 Numbers

Numeric Display Paging
Alphanumeric Paging
Alphanumeric Paging with Voice Mail
Alphanumeric Paging with Data
Alphanumeric with FAX
Voice Mail
Voice Mail with Numeric Display Paging

Voice Mail with Alphanumeric Display Paging
Voice Paging
Voice Paging with Voice Mail
Data

As noted, PSTN originated messages destined for "paging" numbers include voice, numeric, alphanumeric, text data and image data. It is not possible to adequately interconnect most of this traffic to the paging systems using subscriber level PIN connections. The following service features require a DID interconnection:

- 11 Digit access
- Forwarded Call capability
- Rotary Dial Telephone access
- FAX capability
- Automatic (Rotary) Retrieve of Voice Mail
- Announcement services
- Any services that are used in "public" applications.

In general, paging services that are used by business, public safety, government or other agencies must have general public access capability using a standard 11 digit NANP number. One would not expect to see a PIN number listed on a billboard or in a telephone directory, and a PIN access arrangement is unusable for any business that competes with other businesses that use standard 7 or 11 digit NANP numbers. Currently, many "personal" 800 numbers are used to provide very innovative services such as ordering movies on cable TV, personal FAX storage, school closing announcements, weather and sports information, stock market news, restaurant listings, long distance calling cards, private residential, etc.

DIRECT INWARD DIALING IN THE SS7 ENVIRONMENTAdvantages of SS7 Technology

The telecommunications industry is in the process of expanding the traffic capacity and routing capabilities of the Public Switched Telephone Network (PSTN) through the deployment of Signaling System 7 (SS7) technology. SS7 in its most generic form is defined as a call-setup signaling format, transmitted over a data circuit separate from the voice path. SS7 technology also allows the introduction of Advanced Intelligent Network (AIN) services. See figure 1 for a comparison of conventional PSTN and SS7 networks.

SS7 is configured as a data network overlay to the existing PSTN. Using the SS7 network for administrative functions has increased the overall efficiency of the voice network by 10% to 15%. Administrative functions include the monitoring and supervision of the dialed number, answer supervision, call termination, etc. Trunking efficiencies are gained when the data network establishes contact with the distant-end switch prior to connecting the voice circuit. The use of voice circuits for trunk signaling, which is required for PIN paging, is a costly and inefficient interconnection that is many times slower than the high-speed SS7 data network. By identifying the availability and call routing prior to establishing the voice circuit, the use of SS7 for paging interconnection saves trunk costs and capacity normally used on busy or invalid calls.

Importantly, the migration of paging interconnections to SS7 also sets the stage for the introduction of AIN services. The AIN services will incorporate customer database information allowing the public to fully integrate all of their telecommunications services and control call routing. The customers using AIN services will have added ability to screen or block calls, routing enhancements based on time-of-day and/or day-of-week, and customized services to best meet their individual needs.

The benefits of trunking efficiency and enhanced AIN services are derived from the delivery of the Calling Number Identification (CNID) prior to the call set up. The CNID is the

subscriber's unique network address. The format of the CNID, as defined by the industry, is NPA-NXX-XXXX (I.E. a 10-digit DID number.)

SS7 Technology Cannot Be Used with PIN Arrangements

SS7 based services, however, cannot be used with PIN calling arrangements because PIN systems require that each "address" or subscriber in the system have a unique PIN number in addition to a common shared 10 digit PSTN number. In effect, this means that each PIN subscriber (assuming 7 digit PINs are assigned) would have an 18 digit telephone number. The SS7 network, in contrast, is designed only to work with a maximum 10 digit number.

For example, a call to a number utilizing a PIN arrangement requires that the caller first dial the 10 digit PSTN access number and wait for the call to "complete." All PSTN and SS7 network functions are also "completed" to the 10 digit access number at this time. However, the caller accessing a number utilizing a PIN arrangement also must dial the PIN number that defines the subscriber's "address". Without the subscriber's "address" or PIN number, the called number information necessary to do a database lookup function does not exist. As a result, a PIN paging arrangement would preclude a paging subscriber from: (1) forwarding calls intended for their pager number; (2) forwarding calls that originated from a predesignated NANP number; or (3) forwarding calls to some other NANP location. This is because the caller cannot dial the PIN number until after the call "completes" to the common access number. The called system cannot use or receive AIN functions after the caller dials a PIN number. Alternatively, a call to a 10 digit DID number directly defines the NANP "address" and can be instantly sent by the SS7 network to be used for the database lookup of information necessary for the AIN functions.

The following list of AIN services are only available with DID arrangements that use SS7 technology:

Anywhere call pick-up
Call Volume Distribution
Do-not-disturb

Calling Name Delivery
Customized Intercept
Flexible call forwarding

Calling Name on call waiting
Data Security
Follow me service

Interactive Response Unit
Single number calling
Remind me Service
Personal Communications Services

Local Polling
Voice activated dialing
Message T & R Service

Network ACD
Wake up Service

The current AIN switching standards have not defined any AIN service to accommodate the PIN dialing arrangement. If customers using toll-free numbers to access their pagers are forced to use PIN arrangements, they will not have any of the above list of services available to them. Paging carriers mandated to provide only PIN arrangement for toll-free services, will be forced to stop abruptly the natural evolution to advanced technologies.

* * * * *

Subsequent sections discuss examples of some messaging services and the problems associated with required PIN technology deployment. These examples are intended to highlight the technical issues in an understandable fashion.

A popular feature offered by voice mail service providers and PBX equipment suppliers is outbound notification to a pager upon receipt of a voice mail message. See figure 2. Under this service, when a caller leaves a message on a subscriber's voice mail, the voice mail system is preprogrammed to dial an eleven digit paging number followed by an optional second specified (preprogrammed) number. The subscriber is thus notified that he has a voice mail message. The second level of preprogrammed numbers can be the called party's extension number, a set code which holds special meaning for the paged subscriber, or the office number. Some companies use this feature to better educate the paged subscriber. For example, a company may choose to send a "911" for voice mails that are marked urgent, or "411" for informational non-urgent messages. This feature is available as a DID arrangement only. The second preprogrammed number required for this service cannot be used reliably with systems utilizing PIN technology because of the lack of industry standards that define timing and call processing procedures in PSTN switches. In addition, voice mail systems and PBXs are generally not equipped to handle calls to PIN paging arrangements because these systems have very limited capabilities for an expanded numbering plan that requires multiple dialing sequences. Voice mail and PBX systems would require extensive hardware and software modifications to call numbers that go beyond the standard NANP 10 digit format.

Furthermore, voice mail services that are used to terminate calls forwarded from other locations in the PSTN cannot be used with PIN arrangements for three reasons. First, under PIN arrangements, the caller will be connected to the 800 access number and not to the desired voice mail box. In forwarding situations, even if economically viable, manual operator assistance is not feasible because the caller may not be aware of the paging subscriber's identity. In addition, most PIN paging in use today does not provide any operator default. Second, the caller may not be at a touch tone telephone. PIN arrangements require the use of touch tone telephones. Finally, the caller is not likely to know the required PIN number. In contrast, calls made under DID arrangements can be easily

forwarded to a DID 800 number used for paging/voice mail, because the forwarded call is connected directly to a voice mail announcement that explains how to leave a message in the same manner as any answering machine or wireline voice mail service.

5.0

NARROWBAND PCS

The newly auctioned narrowband PCS frequencies allow two-way traffic. The current paging frequencies are only one-way. The new PCS frequencies position the paging industry to generate originating traffic terminating onto the PSTN. Paging carriers will evolve into full service network providers competing openly in the market with cellular, LEC, IXC, and voice mail providers. The DID arrangement currently provides the only gateway to service options for PCS; PIN arrangements will not support these services.

**SUBSCRIBER ACCESS DEGRADATION; INFERIOR DIALING AND
NON-STANDARD ACCESS**

In addition to making impossible or impracticable the provision of various advanced messaging services, the imposition of a PIN technology requirement for toll-free paging services also will place paging providers at a competitive disadvantage with LECs and other providers of messaging services. If the use of PIN technology is required, customers using voice mail services offered by paging carriers would be required to dial 18 digits, while the customers using the voice mail services offered by the LECs and others in the landline and wireless environments would be required to dial only a maximum of 11 digits.

As such, mandatory PIN paging arrangements can be compared to the Carrier Access Code (CAC) requirements that initially were imposed on the non-incumbent Interexchange Carriers. Under the CAC requirement, the caller was required to dial 5 extra digits to access the interexchange carrier network in order to complete long distance calls. The FCC long ago set a precedent on anticompetitive dialing conditions, as stated in the Carrier Access Code ruling involving the IXC's. Regulatory requirements imposed on a segment of the wireless industry, involving additional digits as part of an expanded dialing plan, would be similarly anticompetitive. Only the paging carriers are in a position to determine when PIN paging is a reasonable, competitive, and satisfactory business decision to impose on their subscribers. Any mandatory PIN dialing arrangement will severely hinder the paging industry from fairly competing in the expanding messaging and Personal Communications Services markets because of the burden of dialing additional digits to access the paging system's network.

In addition, the lack of universal access that would result from a mandatory PIN paging arrangement is a significant consideration. Currently, the public can dial from any telephone and be connected to a toll-free service that is accessed on a DID arrangement. PIN interconnection, in contrast, would allow calling from only those telephone devices which have touch-tone capabilities. This would prevent all rotary telephones, some payphones (which block the dialing of additional digits after the initial number) and some calls from foreign countries from using 800 toll-free service. Rotary

telephones still represent a significant portion of the telephones in service today. In a PIN environment, in order to serve rotary phones, a paging carrier would have to offer operator services to which the call would default after a number of seconds if the PIN were not received, increasing costs to paging providers and further undermining their competitiveness.

DID vs PIN – OVERALL NETWORK EFFICIENCY

Although the use of PIN technology in conjunction with toll-free numbers may slow the rate of utilization of special access codes, the use of PIN technology also entails considerable efficiency costs. There are overall network efficiencies gained with DID arrangements that do not exist with PIN methods. All LEC 800 access service rates are based on network usage. PIN dialing arrangements take more network time for completion and are therefore more costly. See Figure 3 for an efficiency comparison of the two methods. The standard DID method is clearly the quickest fashion for completing a call on the PSTN. Furthermore, as a direct result of longer holding times, paging carriers require more equipment and interconnection trunks to handle calls placed in a PIN dialing arrangement. Naturally if the paging carrier needs more equipment, the interconnected LEC will also require the additional complement of equipment. All carriers' networks would have to be built up proportionally to accommodate a PIN-only dialing scheme for paging carriers; the cost of this additional equipment inevitably would be passed on to consumers in the form of higher rates.

DID vs PIN Call Completion Procedures

800 Number DID Call	800 Number PIN Call
1. Caller receives Dial Tone	1. Caller receives Dial Tone
2. Caller enters 1 + 10 digit number	2. Caller enters 1 + 10 digit number
3. Call is routed to a Access Tandem Switch	3. Call is routed to a Access Tandem Switch
4. Access Tandem performs database look-up and routes the call to the appropriate IXC	4. Access Tandem performs database look-up and routes the call to the appropriate IXC
5. IXC performs translation from 800 number to PSTN number	5. IXC performs translation from 800 number to PSTN number
6. IXC routes call to End User Service Provider	6. IXC routes call to End User Service Provider
7. End User Service Provider connects caller to the Service Subscriber (called party)	7. End User Service Provider queries caller for Personal Identification Number (PIN) of Service Subscriber (called party)
8. Call Completion	8. Caller enters PIN
	9. End User Service Provider performs database look-up to identify Service Subscriber

800 Number DID Call	800 Number PIN Call
	10. End User Service Provider connects caller to the Service Subscriber (called party)
	11. Call Completion